GEOLOGICAL SURVEY OF CANADA
G. M. DAWSON, C.M.G., LL.D., F.R.S., Director.

PRELIMINARY REPORT

ON THE

KLONDIKE GOLD FIELDS

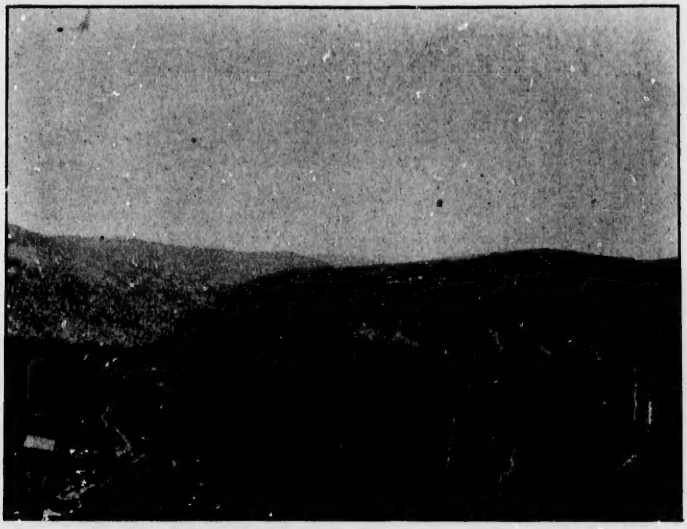
YUKON DISTRICT, CANADA

BY

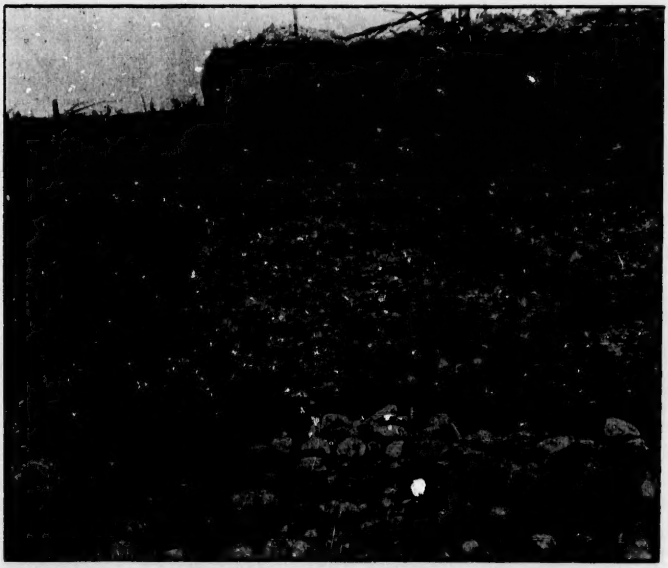
R. G. McCONNELL, B.A.

OTTAWA
GOVERNMENT PRINTING BUREAU
1900

No. 627.



HUNKER VALLEY ABOVE GOLD BOTTOM.
Showing level of old valley.



BONANZA VALLEY.
Section of Quartz Drift, Adams Hill.

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The annexed report by Mr. R. G. McConnell is based almost entirely on field-work carried out by him in the summer of 1899, during which his whole time was devoted to an examination of the Klondike region. It is essentially the report prepared by him for inclusion in the annual Summary Report of the Geological Survey Department; but in order to promptly meet the demand for information and to ensure it an extended circulation, it is now printed separately somewhat in advance of the issue of the Summary Report.

Some account of the geology and conditions in the Klondike gold fields has been given in the Summary for 1898, but the present report may be regarded as the first result of a systematic and moderately detailed scientific examination of the district.

The map accompanying this report is a preliminary one, compiled by Mr. J. F. E. Johnston, largely from surveys made by himself while assisting Mr. McConnell in the field.

GEORGE M. DAWSON.

GEOLOGICAL SURVEY OF CANADA,
March 10, 1900.

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PRELIMINARY REPORT

ON THE

KLONDIKE GOLD FIELDS

Prospectors have been at work in the Yukon Region since about 1878, but mining can scarcely be said to have begun till some years later, and then, at first, only on a very small scale. River-bar mining began on the Lewes and Salmon in 1881 and 82, on the Stewart in 1882 or 1883. This was followed by the discovery of (coarse) gold on Forty-mile River in the autumn of 1886. The tributaries of this stream yielded the next discoveries, and the producing field was gradually extended across the watershed to streams flowing into Sixty-mile River. In 1896 the Klondike discovery was announced and the extreme richness of the new field speedily attracted, in 1897 and 1898, a host of adventurers from all parts of the world. The route followed by the majority was by steamer from Vancouver, Victoria and United States coast towns further south to Skagway or Dyea across the Coast Range by the Chilcoot or White passes to the head of the Lewes, and down the latter stream and the Yukon, in canoes or boats, to Dawson at the mouth of the Klondike River. This route, which entailed considerable hardship and some danger, is still followed, but under very different conditions. The pack-trail of the pioneer across the White Pass has been replaced by a well built and equipped railway, and the canoes and small boats on the rivers have given way to a fleet of steamers. The journey from Vancouver to Dawson can now be made in comfort in about a week, and is well worth taking as a pleasure trip alone. A telegraph line has been built by the Canadian Government from Skagway to Dawson, and although this remains at present separated from the telegraphic system of the world, work is already in progress by which it will soon be connected with this system at Quesnel, in British Columbia.

The discoveries above briefly alluded to brought about rapid changes of various kinds besides those relating to means of communication. Previous to the discovery of (coarse) gold on Forty-mile River the centre of such limited trade as existed in the country was at the mouth of the Stewart River. In 1887 this was removed to the vicinity of Forty-mile River, and this continued to be the chief place until the Klondike discoveries occurred in 1896, when the town of

Dawson was established on the bank of the Yukon just below the confluence of the Klondike River. This rapidly became and has since remained the chief commercial centre.

When a small force of the North-west Mounted Police was first sent into the Yukon District in 1895, in the interests of law and order, it was quartered near Forty-mile River. Later on, this force increased and the circumstances led to the removal of most of the men to Dawson. This place has since become the seat of government for the entire Yukon District. A local administration, with courts of justice and other organizations necessary for the government of the Yukon district have been established, and the city is now not unprovided with most of the requirements of a civilized and progressive community.

This report relates almost exclusively to the Klondike gold fields proper. For information relating to the geology and geography of the Yukon district generally, reference may be made to the Report on an Exploration in the Yukon District (Reprint, 1898) and to the Summary Report of the Geological Department for 1898.

Extent of Klondike Gold Fields.

The Klondike gold fields are situated east of the Yukon River in latitude 64° north. They are bounded in a general way by the Yukon River on the west, by the Klondike River on the north, by Flat Creek a tributary of the Klondike, and Dominion Creek, a tributary of Indian River, on the east, and by Indian River on the south. The area included between these boundaries measures about 800 square miles. The streams flowing through the area described are all gold-bearing to some extent, but only a limited number have proved remunerative. The most important gold-bearing streams are Bonanza Creek, with its famous tributary Eldorado Creek, Bear Creek and Hunker Creek flowing into the Klondike, and Quartz Creek and Dominion Creek, with Gold Run and Sulphur Creek two tributaries of the latter, flowing into Indian River. A good deal of prospecting has been done outside the area described, but with the exception of a few claims on Eureka Creek, a tributary of the Indian River from the south, no pay-gravels have so far been discovered, although good prospects are reported from many places.

Topography.

The Klondike region may be described as a high plateau cut in all directions by numerous deep and wide branching valleys. The general aspect viewed from one of the higher elevations is rough and hilly but

fairly regular. The outlines are rounded, the slopes even, and sharp peaks are notably absent. The region is really formed of a system of long, branching, round-backed ridges, separated by deep, wide, flat bottomed valleys. Most of the ridges, speaking broadly, centre in the Dome, the highest eminence in the district.

The ridges have an average elevation above the valley-bottoms of 1500 feet. They are deeply gashed on both sides by steep gulches and are surmounted by numerous bare rounded prominences separated by wide depressions. They radiate out in irregular curved lines from the Dome and descend gradually, throwing off branches at intervals, towards the main water courses.

The elevation of the ridges and surmounting hills is fairly uniform. The Dome has an elevation of about 4250 feet above the sea, 3050 above the Yukon at Dawson and about 500 feet above the ridges at its base. It is not conspicuously higher than other hills in the neighbourhood, and the gradual decrease in elevation outwards along the ridges is scarcely noticeable to the eye.

The valleys are wide and flat-bottomed in their lower parts, but gradually narrow towards their heads into steep-sided narrow gulches, which terminate abruptly in steep, rounded, cirque-like depressions cut into the sides of the ridges. The valley-flats are marshy, partly wooded, and are wider on the Indian River than on the Klondike slope. The flats bordering the lower parts of Dominion Creek have a width in places of nearly half a mile.

The streams are small, seldom exceeding 15 feet in width, even at their mouths, and along the productive portions of the valleys are much less. They fall rapidly near their heads, but in descending the valleys the grade soon diminishes, and in the case of Dominion and other Indian River creeks does not exceed, in the lower parts of the valleys, 25 feet to the mile. The Klondike streams are somewhat steeper, the grade averaging in the lower parts of the valleys about 40 feet to the mile.

The Klondike River is a large rapid stream averaging about 150 feet in width. It is interrupted by frequent bars, and has a fall of from 12 to 15 feet to the mile. Indian River, which forms the southern boundary of the district, is a much smaller stream. It has a width of from 20 to 40 yards, but is very shallow, the water on the bars seldom exceeding a few inches in depth. The channel is filled, for long stretches, below Quartz Creek, with large angular boulders and the navigation of the stream, even with small lightly loaded boats, is very difficult. The fall of the valley from Australia Creek to the mouth averages about 18 feet to the mile.

Forest.

The forest trees consist of the white and black spruces, the aspen and balsam poplars and a species of birch. No pine or fir trees were noticed. The lower ridges and the slopes of the higher ones up to a height of 3500 feet above the sea, are generally wooded, and stunted spruces occur sparingly on the highest points in the district. The valley-flats are only partly wooded. Groves of spruce and poplar occur at intervals, but alternate with bare swamps and marshes too soft to support a forest growth.

The white spruce is the most important tree for general purposes in the district. It is usually small on the ridges, seldom exceeding a foot in diameter, but in the valley-flats occasional specimens attain a diameter of over two feet and a large proportion of the logs cut for lumber, measure from nine to fifteen inches across. The supply for the mills at Dawson is obtained mostly from the flats and islands along the upper Yukon, and from the Klondike valley and is ample for all purposes for many years to come. The Klondike is bordered at intervals all the way from its mouth to the mountains by groves and small tracts of spruce forest of surprising size and quality considering the latitude, and supplies of well grown spruce timber are also available from all the larger tributaries of the Upper Yukon as well as from the main valley, and can be easily and cheaply floated down to Dawson.

The supply of large timber on the producing creeks themselves is limited, but the bordering ridges are nearly everywhere, except on the higher points, clothed with an open forest of small spruce, birch and poplar ranging from a few inches to a foot or more in diameter. A portion has been destroyed by forest fires, but sufficient remains to furnish all the fire-wood and most of the lumber required for mining purposes for a considerable time.

Geology.

The geology of the gold region is complicated and need only be briefly described here. The rocks are separable into the following divisions, none of which can, as yet, be exactly correlated with formations described in previous reports on British Columbia, the Yukon District or Alaska. The order is ascending, so far as known.

Stratified and foliated rocks, mostly Palæozoic	Indian River series.
	Hunker series.
	Klondike series.
	Moose Hide group (in part.)

Tertiary.

Eruptive rocks { Granites.
Later eruptives.

Indian River Series.—The Indian River beds consist mainly of dark slates, often hard and quartzitic, and occasionally passing into a rock of gneissic appearance from the development of biotite along the cleavage planes. The slates are associated with bands of grayish crystalline limestones often several hundred feet across, quartzites, and toward the upper part of the formation by green schists of volcanic origin.

The Indian River beds occur along the Yukon River from Indian River down to a point three miles below Ensley Creek, and are exposed with few breaks along the whole course of Indian River. They strike in a direction a little south of east and dip as a rule to the north at high angles, but are irregular in this respect. Their thickness is not known.

Hunker Series.—The Hunker beds are mainly lead-coloured and dark graphitic schists somewhat resembling the softer portions of the Indian River series. They include, on Hunker Creek, small bands of limestone and dolomite and some green schists. They are very irregular in their distribution and often occur in narrow, short bands folded in with the Klondike series. They are found in considerable volume along the lower part of Hunker Creek and in narrow disconnected bands crossing Bonanza, Eldorado, Dominion and other creeks of the district.

Klondike Series.—The Klondike series is the most important group of rocks in the district, as it constitutes the country-rock along the productive portions of all the richer creeks, and is, apparently, genetically connected with the occurrence of the gold. The rocks of this series are now mainly light-coloured and greenish micaceous schists, the principal minerals present being quartz, orthoclase, some plagioclase, and sericite. The ferro-magnesian minerals are almost entirely absent. The rocks are greatly crushed and altered and in places are almost entirely recrystallized. They have not, as yet, been closely studied microscopically, but appear, with little doubt, to have originated from eruptives and in part at least to have been derived from a quartz-porphyry. On Sulphur Creek the rocks of this series pass gradually into a granitoid condition.

The principal varieties are a soft, well foliated light-grayish sericite schist, and a harder schistose rock occurring in flags and heavy beds, often sprinkled with rounded quartz blebs and occasionally with angular felspar crystals. They include also a fine-grained hard rock resembling a quartzite. In the eastern part of the district the light-coloured varieties alternate with bands of green well foliated schists, which may belong to an older period.

The rocks of the Klondike series occur along the Yukon from the northern boundary of the Indian River series down nearly to Dawson, and extend in an easterly direction in a wide band across Bonanza and Eldorado creeks, Quartz and Sulphur creeks, and the upper parts of Hunker and Dominion creeks. They occur also on Flat Creek, further to the east, but their limits in this direction are not precisely known, as they pass east of Flat Creek below a heavy covering of gravel. The outline of the area is fairly regular, but is broken in places by occasional spurs from the central mass.

Moose Hide Group.—Under this head I have included a group of green igneous rocks which occurs in Moose Hide Mountain and other points along the northern border of the district. They are schistose in places, but are usually massive and range in texture from a moderately granular to a compact condition. They belong mostly to the diabase group, and have been altered more or less completely over wide areas into serpentine. The rocks included in this group belong to different periods, as some of the members, notably the fine-grained massive variety forming Leotta Mountain, are quite recent, while those at the mouth of the Klondike have a much older look and have been crushed into schists, especially around the edges of the mass. Bands of green schists of uncertain age also alternate all along the lower part of the Klondike with the dark Hunker schists and other rocks.

The Moose Hide group of rocks occurs in angular and rounded areas and wide bands, distributed at intervals along the Klondike valley from its mouth easterly to Flat Creek. Rocks of this group are also found on the ridge separating Hunker Creek from the Klondike and at one point on the ridge east of Hunker.

Tertiary Beds.—Beds referred to the Tertiary occur at several points around the outskirts of the gold district. A wide band follows the Yukon valley above Dawson, on the north-east side, and continues on in a direction a little south of east to the Klondike, which it crosses a short distance above the mouth of Rock Creek. It then follows the Klondike River to the mouth of Flat Creek, and probably underlies the belt of plateau country that borders the latter and extends through to the Stewart.

Exposures of these beds on Rock Creek and the Klondike River consist mostly of soft, grayish sandstones, indurated clays and shales, and occasional beds of ironstone. A thick lignite seam is reported to outcrop on one of the branches of Rock Creek, and other seams occur along the band in its north-westerly extension. A seam, or group of seams, said to be fifteen feet in thickness, is being worked on Cliff

Creek, about seventy-five miles below Dawson, for the supply of that place.

A small area of dark sandstones, agglomerates, hardened clays and shales, was found on Last Chance Creek, a tributary of Hunker Creek, lying at angles on the schists. The sandstones contain small particles of carbonaceous matter, but no lignite was noticed.

Tertiary beds were also found along the southern boundary of the district on Indian River. The northern limit of this area follows Indian River valley from Quartz Creek to a point above New Zealand Creek, and the band extends southward beyond the region examined. The beds lie in easy folds, and consist mainly of soft, light-greyish sandstone, dark, coarse, agglomeratic sandstone, soft, dark shales, and, at one point, of heavy beds of coarse conglomerate. Fragments of fossil plants occur throughout the formation, but no determinable specimens were found.

Granites.—A small area of granite occurs on the Yukon River below the mouth of Indian River, and stretches eastward in a band a couple of miles wide towards the head of Ensley Creek. It is a coarse-grained, grayish biotite variety, and as a rule is coarsely porphyritic.

A large area of granite also occurs at the heads of Burnham and Australia creeks, east of Dominion Creek, and extends southward towards the Stewart. It appears to be older than the mass on the Yukon River, is very coarse-grained, often porphyritic, and in many places has been crushed into an extremely coarse augen-gneiss. Exposures of this rock occur in conspicuous crags along the crests of the ridges separating the tributaries of Dominion Creek from those of Australia Creek.

A third area of granite extends from the mouth of Dominion Creek up to a point two miles above Sulphur Creek and also runs for some distance up the latter creek. It appears to pass gradually, going up Sulphur Creek, into the schists of the Klondike series. It is grayish in colour, medium-grained, and is of the ordinary biotite variety, with few accessory minerals. The biotite gradually disappears on approaching the schists, and is replaced by light-coloured micas, principally sericite.

Later Eruptives.—Small bosses of recent eruptive rocks cutting all the older formations occur everywhere throughout the district. The principal variety is a light-grayish acid rock with a compact base, sprinkled with small dark quartz crystals, and is probably a rhyolite or closely allied rock. In some of the sections felspar phenocrysts

occur with the quartz, and in other places the rock becomes granular. The areas seldom exceed a quarter of a mile in width, and are more numerous around the outskirts of the gold district than towards its centre.

A dark rock, which macroscopically appears to be an augite-andesite, occupies a small area bordering the granite below Indian River, and dark basaltic-looking dikes occur on Indian River, below the mouth of Quartz Creek. A few small trap-dikes cross Eldorado Creek, and a large quartz-porphyry dike forms a point projecting into Bonanza valley at No. 60 below Discovery claim.

The total area covered by the later eruptives is small, but their wide distribution in small bosses and dikes makes them a conspicuous feature in the geology of the district.

Quartz Veins.—Quartz veins are exceedingly abundant in the schists of the Klondike series and also occur, but more sparingly, in the Indian River group and the Hunker schists. The veins as a rule are short and small, but often swell out into large lenticular masses of quartz. They follow in the majority of cases the planes of foliation or cut these at a low angle. A few veins were noticed cutting directly across the strike of the rocks, and these as a rule are more regular and persistent than those which follow the foliation; they may belong to a different group. In addition to the multitude of quartz veins varying in size from mere threads up to huge masses nearly a hundred feet in thickness like that on the Yukon River two miles above Caribou Creek, which follow or intersect the schists of the Klondike series, these schists themselves are often more or less silicified along wide zones, occasionally to such an extent as to resemble quartzites.

The quartz in the smaller veins is usually milky or light-grayish in colour and often when weathered assumes a granular appearance. The veins contain occasional crystals and small patches of felspar and dolomite. The large vein above Caribou Creek has a more compact texture and weathers to a light-yellow colour.

The principal metallic minerals of the veins are pyrite, chalcopyrite, galena (usually argentiferous) and occasionally free gold. The veins are not as a rule well mineralized and the great majority contain nothing except a few scattered grains of pyrite. A number of specimens collected in various parts of the district and analysed in the laboratory of the survey were all barren, with one exception, and that contained only traces of gold. On the other hand, a number of assays made in Dawson from different veins were seen by the writer that showed good values. There can be no question that the placer gold, like the accompanying gravels, is of local origin and is derived from the quartz veins and silicified schists of the district. The large nuggets

nearly always inclose fragments of quartz, and quartz pebbles specked with gold are occasionally found. A boulder found on No. 4 Bonanza Creek, weighing 60 ounces, contained 20 ounces of gold. Evidence of the local origin of the gold is also afforded by the markedly angular and unworn character of the grains and nuggets found in the gulches and along the upper parts of the productive creeks. It is highly improbable that the gold-bearing veins have all been swept away and their metallic contents concentrated in the valleys, great as the erosion in the district has been, and there is every reason to believe that productive veins or zones of country-rock will eventually be discovered. The prospecting of the past two seasons has resulted in the staking of a great number of quartz claims, but very little development work has so far been done. Prospecting can only be carried on at present over a small portion of the district, as the country-rocks are nearly everywhere concealed beneath a heavy blanket of moss.

Gravels.

The gravels of the district are of four different kinds, as follows, beginning with the latest:—

Stream-gravels (present).
Terrace-gravels.
River-gravels.
Old valley gravels (quartz-drift and yellow gravels).

The gravels are described in connection with the creeks, and with the exception of the quartz-drift will only be briefly referred to here.

Section of stream-gravels, claim 27 above discovery, Bonanza Creek. Scale 4 ft. to 1 in.

Stream Gravels.—The stream-gravels form a sheet generally from four to ten feet in thickness, flooring the bottoms of all the valleys. They rest on broken and decomposed schists, and are overlain by a bed of dark frozen 'muck' or peaty matter. They are very uniform in character, and consist entirely of the schists and other rocks of the district. In the lower parts

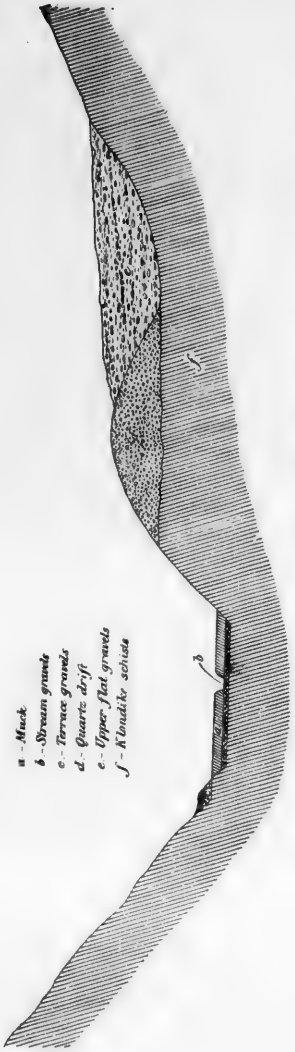
of the valleys, the schist pebbles are usually flat, but are fairly well worn. They measure, as a rule, from one to two inches in thickness and from two to six inches in length. They lie in a matrix of coarse sand, and are associated with a varying proportion of rounded and sub-angular quartz pebbles and boulders, and, less frequently, with pebbles derived from the later eruptive rocks. Small beds of sand occasionally occur toward the top of the section, but, in most cases, the deposit is remarkably uniform from muck to bedrock. In the upper part of the valleys, the gravels become coarser and more angular, and a considerable proportion of the material consists of almost unworn fragments of country-rock washed down from the adjacent slopes.

Terrace Gravels.—Narrow rock-cut terraces occur in an interrupted manner along Eldorado, Bonanza and Hunker creeks, below the level of the old valley, and a wider series along a portion of Dominion Creek, at an elevation of from fifteen to forty feet above the present flat. The terraces support beds of gravel, usually from six to fifteen feet in thickness, very similar to that in the valley-bottom, but showing somewhat more wear. They are covered in a few places with muck.

River Gravels.—At the mouth of the Hunker and Bonanza creeks the quartz-drift is overlain by a heavy bed of well rounded pebbles, evidently representing a former wash of the Klondike River. The pebbles consist largely of hard slates, quartzites and other rocks foreign to the gold-bearing creeks. Wide terraces built of similar material also occur at the mouth of the Klondike and at intervals along the valley of that river.

Old Valley Gravels.—These gravels, bordering parts of Bonanza, Eldorado, Hunker and other creeks of the district, consist of a deposit known as the quartz-drift, resting on bed-rock, and an upper set of flat rust-coloured gravels.

The quartz-drift differs markedly in many of its characters from any deposit either marine, lacustrine, fluvial or glacial, known to the writer. It is uniformly grayish to nearly white in colour throughout, except near the surface, where it has been oxidized to varying depths and in places has a reddish coloration, and in the upper portions of some of the streams, where the grayish colour becomes somewhat darker. The colour does not vary to any material extent with differences in the subjacent rock, as in many places heavy deposits of the quartz drift, looking almost white at a distance, rest on wide bands of dark graphitic schist. It consists essentially of a compact mixture of



Generalized cross-section of Bonanza Valley below Eldorado Forks
Scale 400 feet to 1 inch

small, clear, little worn and often sharply angular quartz grains, and minute scales of sericite, thickly packed with rounded, sub-angular, and wedge-shaped boulders of quartz, and less frequently of grayish mica-schist, the principal rock of the district. The deposit is remarkably uniform from top to bottom. Beds of coarse sand were noticed, but are infrequent, and in the great majority of the sections the silicious sands and the light micaceous minerals have not been sorted into separate beds but remain intimately commingled throughout. The sands become noticeably coarser toward the limit of the deposit on the upper parts of the creeks.

The boulders of the quartz-drift are always more or less rounded and water-worn, and are found in all sizes from small pebbles up to boulders two and three feet in diameter. They occur scattered irregularly through the sandy matrix, or roughly stratified in it, but were nowhere found forming heavy homogeneous beds. They do not show evidence of prolonged rolling. Rounded boulders are occasionally present, but in the majority of cases the edges only are worn away, and wedge-shaped sub-angular fragments, still preserving approximately the shape of the short blunt veins from which they originated, are very common. The proportion of quartz to schist boulders was estimated at fully four to one, and in some sections the ratio is even higher than this. No fragments originating from the bands of dark graphitic schists which cross the valleys at various points, were noticed.

The quartz-drift varies in thickness from a few feet up to about 120 feet, and in width from 300 feet to half a mile or more. The deposit is narrow near the heads of the creeks and attains its greatest development near the lower parts of Hunker and Bonanza creeks, but the increase in volume in descending the valleys is not uniform. It is piled up to great depths on Gold Hill and Adams Hill on Bonanza Creek, decreases in amount on the succeeding hills and in places is absent altogether, and, farther down, after crossing the valley, continues on to the mouth in greatly increased volume.

The quartz-drift is overlain in places by loosely stratified gravels of a very different character. These gravels are usually of a rusty colour, are more distinctly stratified than the quartz-drift and consist mainly of flattened schist pebbles and boulders lying loosely in a coarse sandy matrix. Quartz pebbles and boulders are also present, but are less abundant than in the quartz-drift. The passage from one formation to the other is usually gradual, but in some places is fairly abrupt.

The upper gravels resemble the stream-gravels in the present valley bottom, and have probably a similar origin, but do not carry much gold. They are found on French Hill, Gold Hill, Adams Hill and other places on Bonanza Creek and at several points along Hunker Creek. At Gold Hill they fill a depression about a quarter of a mile in width and 115 feet in depth between the ridge of quartz-drift and the southern slope of the valley. They rest near the valley on the quartz-drift, but further back overlap it and lie directly on the bed-rock. The same relationship between the two deposits obtains on Adams Hill and probably at other points, but it is only at present determinable in places where shafts have been sunk to bed-rock across the whole width of the old valley.

The quartz-drift and associated upper gravels occur on Eldorado and Bonanza creeks and are found for some distance up Gauvin Gulch and Adams Creek, tributaries of the latter; on Hunker Creek and its tributary Last Chance, and on Quartz Creek and its tributary Little Blanche. They were not found on Sulphur or Dominion creeks or on any of the Indian River tributaries except Quartz Creek.

The precise origin of the quartz-drift is still somewhat obscure. It resembles a glacial deposit in appearance, and the writer, as a result of a hurried examination in 1898, attributed it in the Summary Report of the Survey for that year, to small local glaciers. Further and more detailed work, however, has failed to reveal any evidences of ice action either on the boulders or on the surface of the bed-rock. It is not a lake deposit, as both the upper and lower surfaces slope up valleys, heading together and running in all directions, and it does not answer to the character of an ordinary stream deposit. The angular character of the grains and the comparatively unsorted condition of the deposit, show that it has not travelled far, and it is probable that it really represents a comparatively sudden inwash from the neighbouring slopes, conditioned by an increase in precipitation acting upon a surface that had previously been deeply decomposed by a long process of subaerial decay, and operating in conjunction with a stream moving slowly down the valley. The boulders were probably rounded to some extent *in situ* and would necessarily suffer more wear on the short journey than the small particles. The sudden and somewhat tumultuous mode of deposition indicated would also account for the marked absence of differentiation of the constituents of the mass into separate beds.

Gold in gravels.

Gold in paying quantities occurs in the stream-gravels, the terrace-gravels and the quartz-drift, but so far has not been found in the old valley-gravels overlying the quartz-drift or in the gravels here designated as river-gravels.

Gold is found in the stream-gravels everywhere, but in productive quantities only along portions of the valleys. The richest stretches usually occur about midway in the length of the streams. The distribution is however irregular and no fixed rule can be formulated in regard to it. The total length of the paying portions of the different creeks, including some intervening barren parts, aggregates about fifty miles. It is impossible to give even an approximate estimate of the value of this great stretch of pay-gravels, owing to the irregularity of the concentration and the difficulty in obtaining trustworthy returns from most of the mines. It may be stated, however, that the product of a few of the 500-foot claims on Eldorado and Bonanza creeks will exceed a million dollars each; while a considerable number on the same two creeks (in fact, the majority of the lower Eldorado claims and a few on Hunker Creek) will yield over half a million each, and claims running from a quarter to half a million are common on all these creeks and also on Dominion and Sulphur creeks. Assuming a quarter of a million as the average, and that three-quarters of the claims in the distance given above are rich enough to work, the total value approaches $95,000,000, a figure which is well within the mark. In this rough estimate, no account has been taken of long stretches of gravel on all the creeks, that is too low in grade to work at present, but will eventually become payable with improved conditions and cheaper methods of working, nor does it include probable further discoveries along the numerous gulches and small streams of the district, few of which have so far been carefully prospected.

The terrace-gravels on Eldorado, Bonanza, Hunker and Dominion creeks include a few rich claims, and a large number that pay fairly well, but statistics of production are entirely wanting.

The extensive deposits of quartz-drift along Bonanza, Hunker, Eldorado and Quartz creeks, almost rival in importance the creek-gravels themselves. They are everywhere more or less auriferous and are very rich over wide stretches. They suffer, however, from the scarcity of water on the hill-sides, and the ruinous methods the miners are forced to adopt, when operating on a small scale, prevent any but rich claims from being worked.

Methods of working.

Creek claims are worked either by sinking and drifting, or by open-cuts. The former method was the one first employed and is still very generally used, as operations can thus be carried on during the winter. The ground is frozen everywhere, and, except where the muck is free from sand or gravel and can be picked out, thawing is always necessary. This is done either by wood fires, heating the water at the bottom of the shafts with hot stones, or by steam thawers. The latter method is gradually superceding the two former and is a very simple one. A small boiler is generally used, from which the steam is passed through rubber hose, to the ends of which pointed steel tubes about four feet in length are affixed. The latter are driven into the frozen gravel, and steam is forced through them for six or eight hours. They are then withdrawn and the thawed material, removed. The points require steam equal to about one horse-power each, and thaw from one to three cubic yards of gravel at a shift. The introduction of the steam thawer is of recent date, and marks a great advance in the mining methods of the district. It thaws more rapidly than wood fires, requires at least a third less wood to do the same work, and can be used in summer as well as in winter. It has also the further great advantage over wood fires of purifying the air in place of fouling it.

The material drifted out from around the foot of the shaft is piled up in dumps, when the work is done in winter, and washed during the spring floods. In summer work the two operations of drifting and washing the excavated pay-gravels are carried on at the same time, if water can be obtained.

Timbering is seldom required in summer and never in winter, as the bed of frozen muck that overlies the gravel forms an extremely tenacious roof, and chambers of astonishing size can be excavated beneath it in winter without danger. In one case on Dominion Creek, a muck roof, unsupported by pillars, covered a vault said to measure 140 feet by 230 feet which remained unbroken until midsummer. It then sank slowly down in one block, until it rested on some piles of waste material which had been heaped up to prevent accidents in case of a collapse. Examples of muck roofs spanning vaults over a hundred feet in width are common on all the principal creeks.

In working claims by the second method, that of open-cuts, the first object is to get rid of the muck covering. This is easily done in early spring by taking advantage of the spring floods and leading the water by several channels across the claim. The muck thaws readily, the streams soon cut down to the gravel, and the channels then gradu-

ally widen until they meet. In some cases the process is hastened by blowing the walls of the channel down into the stream with powder. When the muck covering is removed, the gravels soon thaw to bed-rock. The upper portion, if barren, is then removed, usually by hand, and the underlying pay-gravel is sluiced in the ordinary way.

The open-cut method of working claims leads to a more complete extraction of the gold and is the one generally preferred whenever the muck covering does not exceed 10 or 15 feet in thickness, a condition which obtains along the greater part of the principal producing creeks, with the exception of Sulphur Creek.

The terrace-gravels are usually comparatively thin, and where uncovered by muck, are worked by open-cuts, where covered, by drifts. The pay-gravels in a few cases are sluiced in the valley-bottom, but as a rule are washed in rockers.

The quartz-drift, like the terrace-gravels, suffers from the scarcity of water, and rockers are employed for washing the pay-gravel at nearly all the working claims. A few of the principal mines have gravity trams, and when arrangements can be made with the owners of the creek claims, the creek water is used for sluicing purposes. The extent and richness of this great deposit appears to fully warrant capital in undertaking the construction of some comprehensive scheme for delivering water along the principal hills, and until this is done the greater part of the deposit must remain unworked.

Machinery—The employment of machinery in the working of Klondike claims is gradually increasing, but is still insignificant, a fact due largely to the absence of roads and the consequent impossibility of transporting heavy pieces up the creeks. Steam thawers are largely used and steam pumps are gradually replacing hand pumps, Chinese pumps and water-wheels for draining the pits. Steam hoists are employed at a few of the mines, but are not in general use. The greater part of the work of the camp is still done by hand, and this, notwithstanding the fact that, taking into consideration the high price of labour, nowhere in the world could machinery be more profitably employed.

Production of district.

The gold production of the district can only be given approximately, but the following figures are probably nearly correct.

1897	$ 2,500,000
1898	10,000,000
1899	16,000,000
	$28,500,000

It is unlikely that the rapid increase in production of the last two years will be continued, as serious inroads have already been made on the rich portions of Eldorado and Bonanza creeks, and to a less extent on Hunker and Dominion creeks, but the amounts remaining, with the long stretches of medium and low grade gravels still untouched on all the creeks, ensure a high production for a number of years.

Descripton of Creeks.

Bonanza Creek.

Bonanza Creek is the most important of the gold-bearing creeks of the Klondike district, and is the one on which gold in large quantities was first discovered. It heads in the Dome Ridge with branches of Quartz and Hunker creeks and empties into the Klondike River a mile and quarter above Dawson, after a course in a north-northwest direction of a little over seventeen miles. It has a drainage-area of approximately 113 square miles. It is a comparatively small stream even near its mouth, where it measures, in ordinary stages of the water, about fifteen feet in width by three or four inches in depth on the bars. It flows, however, a steady stream and furnishes at least a sluice head of water throughout the season all along the productive part of the valley. The principal tributaries of Bonanza Creek are Eldorado Creek, Adams Creek, Boulder Creek, Forty-nine Creek and Sixty-seven Creek on the left, and Carmack Forks, Homestake Creek, Gauvin Gulch, Queen Gulch and Mosquito Creek on the right.

Valley.—The valley of Bonanza Creek is characterized principally by its markedly angular trough-like shape. The present valley has been cut down in the floor of an older valley and that rapidly and almost continuously, as shown by the steep lateral walls and the absence of continuous lines of terraces in the newer valley. The present valley usually shows a flat bottom of varying width, commonly measuring from 300 to 600 feet, bounded by steep sides 150 feet high at the Eldorado forks, and gradually increasing in elevation down the valley, or, with a steep wall of the same height on one side, and an easier slope on the other. It follows a sinuous line, bending with short curves round points that project alternately from either side. The present valley is excavated, as a rule, along one side of the older and much wider valley, and the general effect produced is asymmetrical. On one side the slope is broken, at an elevation usually of from 200 to 300 feet, by a rough plain of irregular size, but often a third of a mile wide, beyond which is an easy ascent of a thousand feet or more to the

summit of the bordering ridge, while on the other side, the slope though varying in steepness is continuous throughout.

The plain of the older valley is not noticeable in the upper part of the present valley, but becomes a marked feature at McKay Creek, three miles above the mouth of Eldorado Creek, and is then traceable along the right bank down to the Eldorado Forks. At the Forks it crosses to the left and follows the left bank to Sixty-seven Creek, then re-crosses and continues on down the right side to the point of the ridge separating Bonanza Creek from the Klondike River. Above McKay Creek, the slopes of the valley become more uniform, but continue for some distance steeper on the left limit than on the right. The bottom gradually narrows in until the valley assumes the V-shaped or gulch type and shortly after it terminates in a steep-sided, amphitheatrical depression cut out of the Dome Ridge.

The grade of the older valley is less than that of the modern one. The rim of the older valley at McKay Gulch is 110 feet above the present valley-bottom; at the Forks it is 150 feet, and at the mouth its elevation is increased to about 300 feet. The grade of the present valley below the Forks averages about fifty feet to the mile, and that of the older valley thirty-three feet to the mile. Between Eldorado Forks and Carmack Forks, the grade of the present channel averages one hundred feet to the mile, and further up it rapidly increases. Besides the wide-spread bottom or plain of the older Bonanza valley, a number of more recent terraces occur at lower elevations. These terraces are rock-cut as a rule, are usually quite narrow, are only traceable for short distances, and occur at irregular heights. They are found at intervals all the way from Lovett Gulch up to near Victoria Gulch.

Country-rocks—The rocks along Bonanza Creek consist almost entirely of the light-grayish and greenish sericite-schists of the Klondike series, alternating in the upper part with bands of green chloritic schists. Narrow bands of dark graphitic schists cross the valley above the mouth at Adams Creek and at one or two other points, and a wide porphyry dike forms a point about a mile below Boulder Creek. The light-coloured schist, which, as elsewhere stated, probably represents a crushed acid eruptive, occurs in heavy beds, in hard flags, and as a finely foliated and soft rock. It is nearly everywhere more or less silicified and encloses numerous quartz veins, most of which run parallel to the schistose structure, although a few cut across it.

Gravels—The gravels along Bonanza Creek fall into five groups. In order of age, commencing with the oldest, the *quartz-drift*, comes

first, followed in succession by the associated *yellow-gravels*, the *river-gravels*, the *terrace-gravels*, and the *valley-gravels*. In order of economic importance the present valley-gravels come first, then the quartz-drift, followed by the terrace-gravels. The two other groups have so far not proved productive.

The valley-gravels consist of clean, flat, fairly well worn pebbles mostly from one to six inches in length and one to two inches in thickness, derived from the light-grayish and light-greenish micaceous schists of the neighbourhood, associated with rounded and sub-angular pebbles of quartz, and occasional large quartz boulders usually angular in form. A few pebbles of dike-rock are also usually present. The material is wholly of local origin and is derived from the rocks outcropping along the valley. The pebbles are roughly shingled up stream, lie in a matrix of coarse sand and are occasionally interstratified, especially in their upper part, with beds of sand. They rest on a floor of broken and decomposed bed-rock, into which the gold has often penetrated to a depth of three or four feet. The gravels form a fairly uniform covering of from four to eight feet in thickness all across the flat bottom of the valley. Their width varies with the enlargements and constrictions of the valley, but usually measures from 300 to 600 feet, with occasional enlargements to 900 feet or more. The width increases gradually but irregularly down the valley.

The gravels are overlain by a bed of black frozen muck all along the valley from five to fifteen feet in thickness. The muck occurs in most places in a massive bed, but is also found interbanded with layers of sand. Small beds of impure muck occur in places in the lower gravels almost down to bed-rock.

The terrace-gravels have a general resemblance to the stream-gravels. They are formed of the same materials but the pebbles show as a rule more wear. They are roughly stratified and include beds of fine pebbles and sand often showing cross-bedding. The terrace-gravels are of limited extent. They rest on short narrow rock-shelves distributed irregularly along the valley, on flat projecting points; or are built up at the mouths of gulches and streams. Their thickness is from six to ten feet. They are uncovered at some points and in other places are deeply buried beneath an accumulation of muck and rocky débris from the sides of the valley.

The river-gravels which occur in the lower part of the valley, overlying the quartz-drift, differ altogether in character from the valley-gravels. They show more wear, are better rounded, and include hard slate, quartzite and other pebbles derived from rocks not found along the

creek. They are similar to the gravels in the Klondike River terraces, and as they occur only on the flat plateau separating the lower part of Bonanza Creek from the Klondike, there is little doubt that they represent the wash of the latter stream at a period previous to the general cutting down of the valleys. They measure fully 200 feet in thickness. Similar gravels also occur on the left side of Bonanza Creek, a short distance above Examiner Gulch and extend in a series of descending terraces or benches down Bonanza Creek and the Klondike River, to the Yukon valley.

The quartz-drift, which with the associated yellow-gravels floors the older and more elevated Bonanza valley, has been described generally on a previous page. This unique and important accumulation of angular quartz grains, sericite and quartz boulders, is extensively, but not continuously distributed along Bonanza Creek. It is necessarily absent where the ancient and modern valleys coincide and has also been swept away in other places by erosion. It is found in descending the creek, covering small areas below McKay Creek and Homestake Creek and a much larger area below Gauvin Gulch. At the latter place it rests on a nearly level rock-floor at an elevation of about 140 feet above the present valley-bottom. It occurs uncovered along the edge of the valley, but farther back is buried beneath an accumulation of loosely stratified gravels and sand. The total width of both deposits at this point measures approximately 2000 feet, and the depth ninety feet. A shaft sunk to bed-rock, 450 feet back from the rim, showed fifty-five feet of the loose upper gravels and thirty feet of quartz-drift. The gravels of the old valley extend from Gauvin Gulch down Bonanza almost to the Eldorado Forks, but the upper gravels only are present along part of this distance, and are also traceable in a narrow band up Gauvin Gulch for a considerable distance, at an elevation of about 100 feet above the stream.

At Eldorado Forks, the plain of the old valley crosses to the left side of Bonanza Creek. A small patch of gravel has been left on the point of the ridge separating the two creeks, and immediately opposite the Forks and extending for some distanee up Eldorado Creek and down Bonanza Creek to Big Skookum Gulch, is the important Gold Hill deposit. The gravels here cover an area about half a mile in length by 1500 feet in width and have a maximum thickness of about 116 feet. The white quartz-drift outcrops at an elevation of 150 feet and appears, so far as can be judged by the shafts, to form a great ridge following the edge of the valley, a hundred feet or more in height and 500 to 600

BONANZA VALLEY.
Below Eldorado Forks, Gold Hill on right.

BONANZA VALLEY.
Claim No. 2 above Discovery.

feet in width, with the hollow behind filled up with the yellow-gravels. The rock surface on which the gravels rest is roughened with small hollows and ridges. It extends back from the river at nearly the same general elevation for several hundred yards, then rises somewhat abruptly to the surface.

The quartz-drift was not observed between Big Skookum and Little Skookum gulches, but comes in again below the latter on Adams Hill and continues to Adams Creek. The gravels on Adams Hill have a width of 1200 feet, and a depth, 550 feet back from the rim, of 130 feet. The arrangement of the quartz-drift and the upper gravels is similar to that on Gold Hill. Below the break formed by the valley of Adams Creek, the quartz-drift and stratified gravels overlaying it, occur pretty constantly, except where cut away by gulches, all the way down to Forty-nine Creek; and at one point below Mosquito Creek the upper gravels cross the valley and appear in a band 450 feet wide and ten to twenty feet in thickness on the right side. The thickness of the deposit on the left limit often exceeds 125 feet. The width is variable but usually measures from 1200 to 1500 feet.

Below Forty-nine Creek, the quartz-drift becomes less continuous for some distance. A small patch occurs below the mouth of Forty-nine Creek, a second opposite claim fifty-seven, below Discovery, and another and the last, on the left limit below Sixty-seven Creek. At the latter point it crosses the valley to the right limit above Cripple Creek, and continues down, gradually increasing in width, past Trail and Lovett gulches and across the plateau in which the ridge separating Bonanza Creek from the Klondike River terminates, to the valley of the latter. The volume of the deposit becomes greatly increased after crossing the valley. Its thickness on the hill between Trail and Cripple creeks is 225 feet, and on Lovett Gulch is not less than 110 feet. The width near the mouth of the valley is fully a mile.

Gold contents of Gravels.—The creek-gravels of Bonanza Creek have been found productive from near Victoria Gulch down into the eighties below Lower Discovery, a distance, measured along the valley, of over eleven miles. The values are however not uniform, and stretches occur which have proved too barren to work under present conditions. The richest and most uniform part of the creek extends from Victoria Gulch down stream for about two miles. A number of claims in this stretch will yield over half a million dollars each, or at the rate of $1000 or more per running foot, while the product of one or two claims is expected to double this amount. The gold contents of the gravels diminish on approaching Eldorado Forks but increase again

below the Forks. A short stretch of the creek about Discovery claim, half a mile in length, including No. 2 above and the famous fraction at the mouth of Skookum Gulch, is extremely rich and in spots almost fabulously so. There is little doubt that the stream-gravels along this part of the valley have been enriched in places by gold derived from the old valley-gravels, and the same process is noticeable at other points farther down. In the lower parts of the creek, the gold in the gravels becomes finer and less plentiful, but paying claims are being worked almost down to the mouth of the valley. Gold is everywhere present, and many claims too poor to repay the great expense of mining at present, will become valuable with improved methods and reduced cost of supplies and labour.

The Bonanza Creek claims are worked both by open-cuts and by sinking and drifting. The former method is the more economical, and is the one generally employed on the more important claims, as the muck covering is comparatively thin in most places and is easily thawed and got rid of by a judicious management of the increased flow of water in the spring. The old plan of sinking and drifting is still employed on some of the claims in summer, increasingly so since the introduction of the steam thawer, and is of course the only method possible in winter.

The terrace-gravels, except on one or two points, are usually quite narrow, and are consequently soon exhausted. They are not so productive as the creek-gravels, but a considerable number of the claims pay good 'wages,' or from $8 to $16 per day per man, and a few yield much higher returns. They are worked largely by rockers.

The quartz-drift or old valley deposit is of scarcely less importance than the creek-gravels themselves. Claims of varying richness, often several tiers deep, have been staked on this deposit wherever it occurs, all the way from McKay Gulch down to the lower end of the valley. The most productive part extends from Eldorado Forks down-stream to near Boulder Creek, a distance of about three miles. Pay-gravels are not, however, restricted to this stretch, as good claims, by which is meant claims that yield over $10 per day per man, are being worked on the hill below Gauvin Gulch, on Lovett Gulch, near the mouth of the valley, and at a number of other points. The values could not be accurately ascertained, as statements of all kinds are current. 'Colours' of gold occur all through the deposit, but the paying portion is usually confined to a band about two feet thick resting on bed-rock. The gold does not penetrate the bed-rock to the same extnt as the creek gold, and is also more patchy and irregular in its distribution.

The quartz-drift is not, as a rule, overlain by muck, and the claims in the first tier are usually worked as open-cuts until the gradually increasing thickness of the deposit compels the use of drifts. In the back tiers the claims are worked from shafts. A few of the mines tram their pay-gravels down to the bottom of the valley and use the water of the main creek or some of its tributaries for sluicing purposes; but in the majority of cases the gold is separated from the gravels by the slow and expensive method of rocking. Water is very scarce all over the area of the hill claims, but a small supply, sufficient for rocking purposes, is usually obtainable from the seepage of the mines. The richness of the hill-gravels is demonstrated by the fact that many of the claims yield high returns, notwithstanding the very heavy expense entailed in thawing out frozen gravel and washing the extracted material in ordinary rockers, in a region where labour commands a dollar an hour and supplies are purchased at rates proportionately high.

Bonanza Creek gold occurs in coarse, rough and flattish grains in the upper part of the creek, and in heavy flakes in the lower. Nuggets are not plentiful as a rule, but occur in considerable abundance near the mouth of Skookum Gulch, where they are evidently largely derived from the hill-gravels. The value of the gold is variable, but is usually about $16.50 per ounce. The gold in the quartz-drift is lighter in colour than the creek gold, is of lower grade, and is more angular and includes a large proportion of nuggets.

Bonanza gulches.

The most important gulches worked along Bonanza Creek are Ready Bullion, Victoria, Big Skookum and Magnet.

Ready Bullion enters Bonanza Creek from the left about a mile and a half above Carmack Forks and several miles above the proved productive part of the creek. It is a typical gulch, about a mile and a half in length, with a fall of nearly 300 feet in the lower mile. The valley is narrow and V-shaped above, but widens out and develops a small flat towards its mouth. The narrow gutter-like bottom of the valley is covered with from four to eight feet of coarse angular gravel and slide-rock overlain by a few feet of muck. The stream is small, and the scarcity of water interfered seriously with mining operations during the past season. This gulch has been staked for a mile or more above its mouth. Some of the claims afford good prospects, and some gold has been extracted, but the amount of work so far done is insufficient to prove its value. The gold is coarse, rough and angular.

Victoria Gulch enters Bonanza Creek from the left, one and three-quarter miles below Carmack Forks and almost at the head of the productive part of the creek. It heads with Gay Gulch, a gold-bearing tributary of Eldorado Creek. It is about one and a half miles in length and in character conforms strictly to the gulch type. At the head is a steep regular amphitheatrical depression leading into a narrow angular valley, that gradually enlarges down the stream. It has a fall of about 900 feet. The gravels are coarse and intermixed, especially in the upper part, with unworn slide-rock. They are not deep, ranging in this respect from two to seven feet, and their width is small in the upper part of the gulch. Work has been done along the gulch for a distance of about a mile above the mouth, and on some of the claims very satisfactory results have been obtained. The gold is coarse, and in the upper part of the valley is rough and angular, with unworn edges, looking if it had just dropped out of crevices in the quartz.

A small tributary of Victoria Gulch known as No. 7, has also been found gold-bearing for a distance of half a mile above its mouth. It joins Victoria Gulch on No. 7 claim above the mouth, and is a short, shallow gulch with a steep grade, the first 1700 feet showing a rise of 400 feet. The pay-streak is narrow, but is fairly rich in places. The gold is coarse and angular, and includes some large nuggets. A flat, oblong, unworn nugget found in No. 7 claim weighed four and one-third ounces.

Skookum and Magnet gulches, below Eldorado Forks, differ in character from those just described. They cut through the quartz-drift down into the bed-rock beneath, and have so far not been proved productive beyond the edge of the drift. The rich claims near the mouth of both gulches have evidently derived their supply largely, if not altogether, from this older deposit, and not from original sources, as in the cases of Victoria and Ready Bullion gulches.

Eldorado Creek.

Eldorado Creek, the most important tributary of Bonanza Creek, is a small stream about seven miles in length and from three to six feet in width at its mouth. It carries, late in the season, barely a sluice-head of water. The valley is flat bottomed for three or four miles above its mouth, but narrow, the flats seldom much exceeding 300 feet in width. The present valley is excavated, like Bonanza valley (of which it is a continuation) in an older and wider one. It shows the same characteristics as Bonanza valley, having a trough-like

depression below, 150 feet deep and from 225 to 450 feet in width, above which the slope is continuous and fairly steep to the summit of the ridge on the right limit, but on the left is interrupted by the plain of the old valley, usually about a quarter of a mile in width. At the extremity of the plain the upward slope recommences, but at a lower angle. The plain of the old valley extends along the left bank of Eldorado Creek for two miles above its mouth, and also occurs on the right bank for a short distance, about a mile farther up. The upper part of the valley, from Chief Gulch upward, is narrow, steep, and V-shaped. Narrow terraces occur at intervals in the lower part of the valley but do not form a conspicuous feature.

Country-rocks.—A few narrow trap dikes cross the lower part of Eldorado Creek, and narrow bands of dark graphitic schists were noticed in one or two places, but with these exceptions the valley is cut altogether out of the light-coloured micaceous schists of the Klondike series. Quartz veins are everywhere present, and at one point examined carried specks of free gold.

Gravels.—The Eldorado Creek gravels are precisely similar to those on Bonanza Creek. They consist of from five to nine feet of flat, schistose and angular or rounded quartz pebbles, covering the bottom of the valley in a fairly uniform sheet, overlain by a few feet of frozen muck.

The old valley-gravels have an elevation above the present valley-bottom, at the mouth of the creek, of 150 feet, and three miles farther up, where they disappear, of 125 feet. They consist, as on Bonanza Creek, of the quartz-drift and an upper series of stratified flat pebbles overlapping the former. Considerable areas of quartz-drift occur at the mouth of Eldorado Creek, forming part of the Gold Hill deposit previously described, and on French Hill immediately below French Gulch, while smaller patches occur about half a mile below French Gulch on the same side, and half a mile below Gay Gulch on the right limit. At the latter point, is the last occurrence of the deposit found in ascending the creek, it is quite narrow and has a thickness of only eighteen feet. It lies in a shallow pitted channel-like depression running parallel to the present valley. At French Hill, a mile and a half further down, when it next appears, it has a thickness including the upper gravel, of over a hundred feet, and a width of half a mile. The occurrences between French Hill and Gold Hill are small and unimportant.

Gold contents of gravels.—The productive portion of Eldorado Creek extends from the mouth of the valley up to near Gay Gulch, a distance

of about three and a half miles. The gravels along this stretch of the valley are of extraordinary richness, and few breaks have been found in the continuity of the pay-streak. Some of the claims will yield more than a million dollars each, or at the rate of $2000 per running foot, while ground running $1000 per running foot is common. The pay-gravels extend practically, with varying values, all across the bottom of the valley, and have a thickness of from three to four feet. The gold also penetrates the bed-rock to a depth of two feet or more. The upper part of Eldorado Creek has so far not proved productive.

Terrace gravels of moderate richness occur along the valley at intervals from Gay Gulch down to the mouth.

The quartz-drift is of less importance along Eldorado Creek than on Bonanza Creek, but has yielded good returns from many of the claims on French Hill.

Eldorado gold is very coarse and is often almost unworn. Nuggets are more plentiful than on the other creeks, and are often found in an imperfectly crystalline condition. The gold is lighter in colour and of a somewhat lower grade than that of Bonanza Creek.

Hunker Creek.

Hunker Creek is a tributary of the Klondike into which it empties eight miles above the mouth of Bonanza. It heads close to the Dome, with Dominion Creek, and flows in a north-westerly direction. It has a length of fifteen miles, and is about equal in size to Bonanza Creek. The most important tributaries are Last Chance and Gold Bottom creeks, both of which come in from the left.

Valley.—The valley of Hunker Creek is remarkably similar to that of Bonanza Creek, and like it, its present form is due to a secondary valley sunk in the floor of an older one. The recent valley has a depth in bed-rock, near the mouth, of 300 feet, and including the gravels, of over 400 feet. It is a steep-sided flat-bottomed trough, two to four hundred yards wide near the mouth, gradually narrowing up the stream. Its width is more irregular than the Bonanza valley, and the basins developed at intervals in the lower part are wider. The plain of the old valley is a marked feature from the mouth up to a point half a mile above Gold Bottom Creek, a distance of eight miles. It disappears there but comes in again for a short distance a mile and a-half further up.

A few rock-cut terraces occur below the plain of the old valley, but are seldom very conspicuous. Like those on Bonanza Creek, they are narrow, irregular in height, and usually quite short.

Country-rocks.—The rocks along the upper part of Hunker Creek consist of the light-coloured sericite-schists and the greenish chloritic schists of the Klondike series, cut by a few small bosses of rhyolite. From Colorado Creek to the mouth the same rocks also occur, but are associated with wide bands of the lead-coloured and dark graphitic schists of the Hunker series, some green schists and occasional bands of limestone.

Gravels.—The gravels on Hunker Creek, like those on Bonanza Creek, are of four different kinds, viz., the present creek-gravels, the terrace-gravels, the old valley-gravels and a sheet of river-gravel overlying the latter near the mouth of the valley.

The creek-gravels are all local in origin, and are similar in character to the Bonanza Creek gravels. They consist of flat schistose pebbles, sub-angular quartz pebbles and boulders, and occasional pebbles derived from the newer eruptive rocks. They have a thickness of from four to ten feet, and are overlain by a bed of muck or peaty material ranging in thickness from about twenty feet downwards At Discovery, the thickness of both muck and gravel is less than ten feet for a short distance.

The terrace-gravels are more rounded than the creek-gravels, but are otherwise very similar. They occur in narrow disconnected strips along both sides of the valley at various elevations up to 100 feet above the present valley-bottom. They have a maximum thickness, in the sections examined, of seventeen feet, and in places are of considerable economic importance.

The old valley-gravels have a wider distribution along Hunker Creek than on any creek in the district. They commence, in descending the valley, in a comparatively thin narrow band on the right limit opposite No. 4 below Discovery, where they occupy a basin-shaped depression on both sides of No. 6 Gulch. They are absent below this point for some distance, but reappear on the left limit half a mile above Gold Bottom Creek, and continue down on the same side, except when broken through by the valleys of the larger tributaries, to Henry Gulch, near the mouth of the valley. A few small patches also occur on the right limit between Gold Bottom and Hester creeks, and below Last Chance Creek the main deposit crosses Hunker valley and continues through in a wide band to the Klondike valley.

The character of the quartz-drift on Hunker Creek is similar to that on Bonanza Creek. When typically developed it is a greyish, almost white, compact deposit, consisting mainly of sericite, clear

angular quartz grains, quartz pebbles and boulders and a few schist pebbles and boulders. It is also overlain in places, as on Bonanza Creek, by a yellowish loosely stratified deposit of flat pebbles, derived mostly from the Klondike schists. The thickness of the quartz-drift between Gold Bottom and Last Chance creeks ranges, as a rule, from twenty to fifty feet, and the width from 500 to 1500 feet. Below Last Chance Creek it has a thickness of over 100 feet and a width of nearly a mile.

The river-gravels are confined to the lower part of the valley, where they cover a flat plateau separating Hunker Creek from the Klondike above their junction, and are also found in a small terrace on the left side. They consist of well rolled and usually small pebbles of slate, quartz, quartzite, schist, granite and sandstone, occasionally interstratified with beds of sand.

Gold contents of gravels.—Creek claims of varying richness are being worked along Hunker valley from claim No. 42 above Discovery down nearly to No. 60 below, a distance of about ten miles, and pay-gravels are also reported from several points lower down. A stretch of the creek about three-quarters of a mile in length, about Discovery claim, has proved extremely rich, and in places is stated to yield at the rate of $1000 per running foot. Terrace-gravels, affording moderate, and in one or two cases high returns, occur scattered along the sides of the valley from the Forks down almost to the mouth. The quartz-drift has not proved so rich as on Bonanza Creek, but numerous claims yielding fair values are being worked for some distance above and below Gold Bottom Creek and on both sides of the valley below Last Chance Creek.

Hunker Creek gold, like that of most of the other creeks, occurs in coarse, bulky grains, with occasional nuggets in the upper part of the valley, and in flatter and smaller grains lower down. In the rich stretch near Discovery claim nuggets are fairly numerous. The gold from about claim No. 45 below down to No. 59 below is generally superficially darkened by iron.

Gold Bottom and Last Chance creeks, the two principal tributaries of Hunker Creek, are both gold-bearing and have been worked to some extent for several miles above their mouths. A band of quartz-drift extends up Last Chance Creek, following the left limit, to No. 15 pup, a distance of two and a half miles, and is fairly rich in places. The gold obtained from the upper part of the band is very angular and is often crystalline.

Dominion Creek.

Dominion Creek is the largest and one of the most important of the gold-bearing creeks of the district. It heads with Hunker Creek near the Dome, and flows at first in an easterly direction, but gradually bends around to the south and then to the west before uniting with Australia Creek to form Indian River. Its length, following the valley around its semicircular course, is about thirty miles. The principal tributaries are Caribou, Portland, Laura, Hunter, Gold Run and Sulphur creeks from the right, and Lombard, Remington, Champion, Nevada, Jansen, Kentucky and Rob Roy, from the left.

Valley.—Dominion Creek valley has the general characteristics of the valleys of the district. At its head is a steep amphitheatrical depression, very regular in form, cut into the 'divide' between Dominion and Hunker creeks. Below this a deep, narrow valley is developed, with steep slopes almost meeting below. Further down, the bottom slowly widens out; small muck-covered flats, increasing gradually in width, border the winding stream, the grade diminishes and the slopes up to the high bounding ridges become easier. In the lower part of Dominion Creek the flats have an extraordinary width compared to the size of the stream. From Jansen Creek to the mouth, they nearly everywhere exceed a third of a mile and in places spread out to half a mile or more. The stream itself, at the mouth, has a width of about twenty-five feet with an average depth on the bars of about a foot.

Terraces have been traced along the left limit of Dominion Creek from a point a short distance below Lombard Creek, down to a point below Jansen Creek, a distance of twelve miles. They occur on the same side just above the mouth of Australia Creek, and probably also at points between Jansen and Australia creeks. They have not been found along the right limit. These terraces evidently mark an old stream-level. They are low, seldom exceeding forty feet in height, and in many places are scarcely twenty feet above the present valley-bottom. The terraces do not form a continuous line down the valley. The deposition seems originally to have been very irregular, and they have since been destroyed in many places, by side streams and by erosion.

Country-rocks.—The rocks on Dominion Creek present greater variety than on the other creeks in the district. The upper part of the valley is cut through the greyish sericitic schists of the Klondike series, alternating with bands of greenish chloritic schist. The latter is fairly massive in places and is often filled with grains of pyrite and magnetite. In the central part of the creek the Klondike schists are

largely replaced by biotite-bearing schists, greenish schists and hard quartzose schists. Bands of dark graphitic schists are also present, and limestones were found in the right bank opposite claim No. 136, below Discovery, also in the dump on claim No. 123, below Discovery. These rocks resemble the schists on Indian River and are probably largely of clastic origin, and older than the Klondike schists. They are replaced about midway between Gold Run and Sulphur creeks by the area of grayish granite referred to previously as occurring on Sulphur Creek, and this rock continues on to the mouth of the valley, and down Indian River for a short distance.

Gravels—The gravels on Dominion Creek like those of the other creeks of the district are altogether of local derivation, and consist of a mixture of flat pebbles of greenish and greyish sericitic schists in the upper part of the creek, the same rocks accompanied by hard quartzose mica-schists below lower Discovery, and with granite in the lower part of the valley. Quartz pebbles and boulders are everywhere fairly abundant as constituents of the gravels and are often of large size. The same passage from angular pebbles in the upper part of the creek to more rounded forms farther down, noticed on the other creeks, also prevails here. Between the two Discovery claims the pebbles are smaller than usual, a fact due to the softness of the country-rock.

The thickness of the gravel and overlying muck on Dominion Creek is less than on Sulphur Creek and about equal to that on Hunker Creek. At claim No. 20 above Upper Discovery, in the gulch part of the valley, the gravels have a thickness of three feet and are overlain by about fifteen feet of muck and sand. Between the two Discoveries, the most productive part of the creek, the gravels range in thickness from two to seven feet, and the overlying muck and associated sandy clays from about five to fifteen feet. Farther down, near the mouth of Laura Creek, the thickness of muck and gravel increases to about forty feet. The depth to bed-rock in the lower part of the creek was not ascertained as no work was in progress, but is stated to be about thirty feet.

The gravel in the terraces resembles that in the creeks, and consists of the same material, somewhat more rounded as a rule; but at a couple of points the terrace is built up of a mass of large angular fragments of bed-rock massed confusedly together. The thickness of the bench-gravels ranges from six to fifteen feet. They are not generally overlain by much muck.

Gold—The most productive part of Dominion Creek extends from near the mouth of Lombard Creek down to a point about half a mile below Lower Discovery, a distance of about five and a half miles.

The pay-streak is not uniform along this stretch, and the values, according to the present workings, are very variable. In the richer portions the gold-contents of the gravels approximate $500 per running foot, and in the poorer parts the returns have not paid working expenses. A great majority of the claims, however, situated along the portion of the creek mentioned, promise good returns if economically worked. Above Lombard Creek, a number of claims have been worked at intervals, mostly by 'laymen,' for a distance of over two miles, some of which have proved fairly rich. In the opposite direction, claims have been worked for several miles below Lower Discovery. At Claims No. 73D and 74 below Lower Discovery fair pay is stated to have been found. The total length of the creek along which gold in fair quantities has so far been found exceeds eleven miles. In the wide lower part of the creek considerable prospecting has been done all along the valley, mostly, however, as representation work, and discoveries of pay-gravel have been reported, but I was unable to verify them.

The bench-gravels along the left side of Dominion Creek are of great importance. They commence below Upper Discovery and extend, so far as known, in an intermittent manner down to 133 below Lower Discovery, a distance of over thirteen miles. Their distribution along the valley corresponds in a general way with that of the more productive part of the creek-gravels. They extend, however, somewhat farther down the valley, as a claim was being worked during the past season opposite 133 below Lower Discovery which was said to give good returns. The terrace-gravels about Lower Discovery and up the valley to near Upper Discovery have proved extraordinarily rich in places, and some of the claims have yielded large returns for the amount of work done.

The gold on Dominion Creek, above Lombard Creek, occurs in large, rough, rounded or angular grains and in small nuggets. Farther down a mixture of heavy grains, some well worn and others quite rough, with a more flaky variety and an occasional large well worn nugget are found. A nugget weighing 8½ ounces was found on claim No. 2 below Upper Discovery. Towards the lower portion of the productive part of the creek, the gold becomes finer and more flaky and large nuggets disappear.

The bench or terrace gold occurs in fairly large, flattened grains, more uniform in size and smoother and more worn than the creek gold. Large pieces are not plentiful, but occasional nuggets are found, the largest known to me weighing about 4½ ounces.

Mining on Dominion Creek is carried on by the two ordinary methods. The overburden of muck is comparatively thin along the productive portion of the creek, and the conditions are favourable for open work in summer.

Mining has been greatly hampered by the excessive freight rates and consequent high cost of supplies and machinery, and the net product of the creek during the past season proved somewhat disappointing, notwithstanding the large gross output. A good wagon-road has, however, now been constructed by the Government, and prices will no doubt in future be materially reduced.

No pay-gravels have so far been found on the numerous gulches and streams entering the productive part of Dominion Creek, with the possible exception of some benches on Caribou Creek, reported late in the season. Towards the mouth of the creek, Gold Run and Sulphur creeks, two tributaries from the right, are both gold-bearing; but in the upper part the gold, as at present known, is confined almost entirely to the main stream-channel. The gold is undoubtedly of local origin, and there is little doubt that discoveries on some of the feeders will eventually be made.

Sulphur Creek.

Sulphur Creek heads in the Dome and empties into Dominion Creek two and a half miles above Australia Creek. It has a length of about seventeen miles measured along the valley. At its mouth it is a stream about twelve feet wide with an average depth on the bars of about six inches. In the productive part of the creek the water-supply is much smaller, but except near the head, one or more sluice-heads of water are usually available. The principal tributaries are Green, Friday, Meadow, and Brimstone gulches on the left, and Quinn and Black Diamond gulches on the right.

Valley.—The valley of Sulphur Creek is sunk from 1000 to 1500 feet below the crests of the bordering ridges. The slopes are easy and very uniform, and are somewhat steeper on the right limit than on the left. In the upper part the valley is narrow and gulch-shaped with a steep grade, but it gradually widens toward the mouth, and at the same time the inclination lessens. For some distance above the mouth the grade scarcely exceeds twenty feet to the mile, as measured by the aneroid. The increase in width is fairly uniform, but slight expansions and contractions occur at intervals all the way down. At the mouth of Green Gulch, about five miles from the head of the valley, its bottom is 300 feet wide, and is cut by a narrow muck gorge thirty feet deep, in which

the stream, here only about three feet in width, is confined. Seven miles farther down the valley-flat has a width of 750 feet, and near the mouth this increases to nearly a third of a mile. A general cross section of the valley, shows a flat of varying width bordering the stream, from the edges of which the surface rises gently to the bases of the main slopes of the valley; then a sharp ascent of from 700 to 1000 feet, followed by easier slopes to the crests of the bordering ridges. A marked peculiarity of Sulphur valley is the absence all along its course of well marked terraces. Toward the mouth, breaks in the uniformity of the slope simulating terraces were noticed at several points, but when examined did not carry gravel. Sulphur Creek is singular in this respect, as gold-bearing terraces occur on all the other productive creeks of the district. Small terraces may yet be discovered as the valley has not been fully prospected, but no continuous system exists.

A second peculiarity of the valley is the slight continuous rise, referred to above, between the edge of the flat, bordering the creek, and the base of the hills, amounting in some parts to fifty feet or more. Bench claims have been staked along this rise, but in the places where shafts have been sunk through it, bed-rock has been found at about the same level as near the creek, and the rise has been shown to be due to a great accumulation of muck. It is possible, however, that in places some terraces may be buried beneath the muck so completely, that no signs of them appear on the surface.

Bed-rock.—In the upper part of Sulphur Creek and down to about claim No. 50, below Discovery, the rocks consist principally of the greyish and light-greenish schists of the Klondike series, similar to those found on Upper Bonanza. The schists are cut by numerous quartz veins and by occasional bosses and dykes of rhyolite (?) In the lower part of the valley the schists become coarser, more granular, and appear to change gradually to a granite gneiss, and near the mouth of the creek to a granite. Exposures are scarce along the valley, and the character of the rocks can only be ascertained from specimens obtained from shafts which have been sunk into bed-rock.

Gravel.—In the upper part of Sulphur Creek, where the narrow gulch type of valley obtains, the débris which has accumulated in the bed of the streams consists largely of angular pieces of schists and occasional fragments of little worn quartz that have slipped down the steep hill-sides. Farther down, the flattened schist pebbles become smaller and less angular, are loosely stratified and lie in a matrix of coarse yellowish and greyish sands, and are interstratified in places

with beds of sand. In the lower part of the creek the dumps are whitish in colour and resemble at a distance dumps of quartz-drift. The light coloration is due, however, to the decomposed granite rocks into which the lower part of the shafts are sunk. The gravels consist mainly of the greyish and greenish schists of the Klondike series, except on the lower part of the creek, where there is a considerable addition of gneissic and granite pebbles. Quartz pebbles and boulders, angular, sub-angular, or rounded are everywhere fairly abundant, and pebbles of rhyolite, and of a dark coarse augite-porphyrite, the origin of which is unknown, are of occasional occurrence.

The gravels vary in thickness from two to eight feet or more. In the productive part of the creek they average about three feet, on the claims examined. The overburden of muck on Sulphur Creek is extraordinary heavy, much more so than on the other creeks of the district. On claim No. 36 above Discovery the gravels run from three to three and a half feet in thickness, are overlain by fifty-five feet of frozen muck, so pure, that a shaft was sunk down to the gravel with pick and shovel, no thawing being required. About Discovery the muck is about forty feet in thickness, and on claim No. 33 below Discovery it is thirty feet thick and rests on three or four feet of gravel. In the lower part of the creek the muck thins out considerably and the section of both gravel and muck is stated not to exceed twenty to twenty-five feet. No claims were being worked in this part at the time of my visit and I was unable to obtain measurements.

Gold contents of gravels.—Claims were being worked on Sulphur Creek at the time of my visit at various points from No. 69 above, to 33 below Discovery, a distance of over ten miles. Claims have also been worked at a profit in the forties below and it is stated on good authority that pay-gravels have been obtained at No. 75 below, increasing the productive part of the creek to about fifteen miles. The gold is distributed somewhat irregularly. The best part of the creek, so far developed, extends from about Green Gulch down to a mile or so below Discovery. It is estimated that in parts of this reach the yield will amount to and in places exceed $5000 per running foot, or at the rate of a quarter of a million dollars per claim. Only a few of the claims promise this amount, but good ground has been proven to exist along the greater part of this stretch and but few blanks have so far been found.

In the lower part of the creek the valley is wide, and the location of the pay-streak is a lengthy and expensive undertaking. One or more holes have been sunk on most of the claims, but the prospecting so far done has been insufficient to prove their value.

Sulphur Creek gold is coarse, angular and nuggety in the upper or gulch part of the valley, but lower down becomes finer, shows more wear, and large nuggets are much less abundant. A sample of gold examined, as far down as No. 33 below, was flaky, but still fairly coarse and rough. It is stated that the grains increase again in weight near the mouth of the creek.

The 'black sand' associated with the gold, consists mainly of pyrite, magnetite and hæmatite, derived from the green schists of the district. The larger nuggets hold fragments of quartz, and all the evidence obtainable goes to show that the gold is of local origin, and is derived from the veins and silicified schists of the valley.

None of the tributaries of Sulphur Creek have so far proved productive, but it is highly improbable that the gold is confined entirely to the main valley, and it is confidently expected that future prospecting along the side gulches and streams will eventually reveal other sources of supply.

The deep bed of muck covering the gravels along the productive part of Sulphur Creek, prevents open work, except in one or two favourable spots, and mining is carried on almost entirely by sinking and drifting. A heavy muck roof entails some extra expense in hoisting, but adds to the safety of the workings.

Gold Run Creek.

Gold Run Creek was examined only in a hurried manner for a distance of four miles above its mouth. It is one of the principal tributaries of Dominion Creek from the right and enters the latter stream about four miles above Sulphur Creek. It has a length of about eight miles and a course nearly parallel with that of Sulphur Creek. At its mouth it is a stream about six feet in width by six inches deep on the bars, but five miles above its mouth, its size has diminished to about three feet in width by three inches in depth.

The valley of Gold Run conforms to the general type of the country. It is flat bottomed and about a quarter of a mile wide near the mouth, with an easy gradient, but becomes narrower and rises more quickly towards its head. The bordering ridges are uneven and have a height of from 1200 to 1500 feet. Low terraces occur near the mouth and at some points farther up, but no continuous system exists.

The country-rocks are nearly everywhere concealed, but judging from the material on the dumps appear to be mostly green chloritic

schists. At claim No. 36 a band of hard, green, rather massive rock crosses and constricts the valley.

The gravels are more quartzose than is usually the case, and consist of rounded and angular quartz pebbles and boulders of all sizes up to a foot or more in diameter, and flat pebbles of the green country-rock. They range in thickness from five feet down to a few inches, and are overlain by from fifteen to twenty feet of interstratified sand and muck.

Gold Run Creek is singular in having its most productive part situated towards its mouth. It is possible, however, that discoveries may still be made higher up, as mining has practically only begun on the creek and it has not yet been thoroughly prospected. Claims were being worked, at the time of my visit, from a point about a mile and a half above the mouth, up the valley for about three miles. The best claims, however, so far developed, occur along a stretch of the valley a mile in length, commencing about two miles above its mouth. The gravels along this stretch have proved to be very rich in places and some of the claims have yielded good returns.

Gold Run gold is coarse and angular and with the exception of a few smooth grains does not show much wear. Nuggets are not plentiful, and none had been found at the date of my visit over an ounce in weight.

Quartz Creek.

Quartz Creek, a tributary of Indian River, is a stream about nine miles in length, and has a width at the mouth of fifteen feet. It forks repeatedly along its course and with its numerous branches has carved out the widest and most conspicuous basin in the district. The principal tributaries are Calder, Little Blanche and Cañon Creeks on the right, and Toronto and Mack's Fork on the left. The valleys of the main stream and the larger tributaries have the usual wide, flat bottoms in their lower parts, and are bordered in places by well marked terraces.

Quartz Creek was the first creek on which gold was discovered in the district, but the production up to the present time has been comparatively insignificant, and at the time of my visit very little work was in progress on the creek claims. The comparative leanness of the creek-gravels, so far as known, is remarkable, as this stream with its numerous tributaries cuts nearly everywhere through the Klondike schists, the gold-bearing rocks of the district, and has carried away and presumably concentrated the metallic contents of an enormous amount of material.

Quartz Creek is bordered on the right limit, between Calder and Cañon creeks and for some distance above the latter, by an important terrace built principally of the quartz-drift, the only instance known of the occurrence of this deposit on the Indian River slope. The terrace below Cañon Creek is 110 feet high and in places nearly a third of a mile wide, a shaft sunk on it opposite claim No. 6 below Discovery, 1100 feet back from the rim, showed about 45 feet of quartz-drift overlain by 55 feet of the upper yellowish gravels. A second deep shaft a short distance lower down, passed through 65 feet of the yellow-drift and six feet of the quartz-drift.

The Quartz Creek quartz-drift resembles that on Bonanza and Hunker creeks, but is rather darker in colour, shows more distinct bedding, and contains a larger proportion of schist pebbles and boulders. It has proved moderately rich in places and a number of claims are being worked along it with varying success.

The tributaries of Quartz Creek, more especially those on the right side, afford good prospects, but no important strikes have so far been made on them.

Eureka Creek.

Eureka Creek flows into Indian River from the south, five miles below Australia Creek. It is a small stream, about eight feet in width where it enters Indian River valley, and about ten miles in length. It divides three miles above its mouth into two nearly equal branches, both of which head in a range of high hills that border this part of Indian River valley on the south.

The valley of Eureka Creek conforms to the general type of the district. In the lower part, the muck-covered flat bordering the stream is from 300 to 500 feet wide, but above the forks it soon contracts into a narrow gulch. A well-defined bench fifty feet in height occurs on the left limit opposite the forks and continues up the creek for a couple of miles. At No. 4 above Discovery, the terrace is ninety feet in height.

Rocks.—The rocks on Eureka Creek consist of slates, slaty quartzites, dark micaceous schists and green schists, dipping at high angles and striking in an easterly direction. These are the same rocks that are found on the Yukon River below Indian River and on the lower part of Indian River and referred to as the Indian River series. They are older than the Klondike schists which they border to the north, and are probably of Cambrian age. These rocks belong to an entirely different group from those cut

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by the principal auriferous creeks, and the fact that they are gold-bearing greatly widens the area of possible discoveries.

Gravels.—The Eureka stream-gravels consist mainly of imperfectly rounded pebbles of dark and greenish schist. Quartz pebbles and boulders, sometimes of large size, are also present, and granite occurs occasionally. In the upper part of the creek, the gravels as usual become coarser and more angular. The bed of stream-gravels is from four to eight feet in thickness and is overlain by from ten to twenty feet of muck. The terrace-gravels consist of the same materials as the stream-gravels but are rounder and more worn. Quartz pebbles also seemed to be rather more abundant.

The yield from Eureka Creek has so far been small, and at the time of my visit very little work was being done. A few prospecting shafts were being sunk, and at No. 17 above Discovery, a crew of miners were engaged in sluicing with satisfactory results. The gold obtained here was rough and fairly coarse and included a number of small nuggets. The valley-bottom at this point is narrow and steep, but the supply of water, except in the spring, is too limited for ground-sluicing, the method by which it could be worked to the greatest advantage, and is barely sufficient to supply a set of small sluice-boxes.

Good prospects have been obtained at several points from the benches along the left limit of Eureka Creek, on which a good deal of work will be done during the present winter, and also on several claims on the right fork and on a branch of the latter.

Prospecting on Eureka Creek is an expensive operation. Supplies are packed in by way of the Dome and Sulphur ridge, and are also brought up the Yukon and Indian rivers in boats, but both routes are long and difficult, and until the rates are greatly reduced only the richer parts of the creek can be worked at a profit.

Other streams.—The flat bottom-land of the Klondike valley below the mouth of Hunker Creek, and more especially from the mouth of Bonanza valley for some distance down, has afforded very good prospects, ten cents or more to the pan being reported from some of the shafts. The valley above the mouth of Hunker Creek has not, so far, proved valuable.

Indian River, bordering the southern part of the Klondike region, has yielded small amounts of gold from bars. The valley-gravels are also said to yield fair prospects but are not being worked. A wide gravel terrace, that deserves attention, follows the left limit of the valley from the mouth of Australia Creek down to a point below

Quartz Creek. It affords colours of gold, but has not been sufficiently prospected to prove its value. Other terraces, all carrying gold to some extent, also occur in places along the right limit, usually near the mouths of the tributaries.

Australia Creek, which unites with Dominion Creek to form Indian River, has been prospected to a considerable extent, but so far as the creek-gravels are concerned, with little result. A well marked and wide terrace, practically a continuation of that on Indian River, follows the left limit of the valley for a number of miles above its mouth. The terrace-gravels have a thickness of over sixty feet in places, and carry small quantities of fine gold from the surface down. A company was engaged during the past season in an attempt to locate a pay-streak, but the result of the operations is not known.

All Gold and Two Much Gold creeks, both of which rise near the Dome and near the sources of Hunker and Dominion creeks and flow outward (the former emptying into Flat Creek and the latter, into the Klondike River a short distance below the mouth of Flat Creek), were the scenes of a rush a couple of years ago, but the result has not justified expectations, and at the present time they are almost deserted.

Flat Creek is bordered on the east by a plateau fully 600 feet in height and several miles in width, formed entirely of loose gravels, sand, and sandy clay. This formation is quite recent and is usually regarded by the miners as the wash of an old channel of the Stewart. It was only examined at one point and the evidence obtained there pointed to its deposition in a lake-basin. It covers a considerable area, as it is stated to run through from the Klondike to the Stewart and to extend for some distance past both streams. The deposit has been prospected to some extent and shown to contain a small amount of fine gold, but no rich spots have so far been found. It is, however, worth investigation as a possible field for operations on a large scale.

Very little work was done during the past season in the Yukon district, outside the Klondike gold fields. The Stewart River was further prospected by a few parties and reports of strikes on some of the tributaries were current, but it was impossible to learn anything definite about them. A strike is also reported farther to the north on a couple of tributaries of the south fork of the Salmon, and a small quantity of coarse high-grade gold purporting to come from there, was seen by the writer when on the way out. The creeks at the head of Sixty-mile River, which were almost abandoned after the Klondike discoveries, are also again beginning to attract some attention.

The outlying districts have been neglected by the old miners since the Klondike discoveries were made, and the work of the many inexperienced men who have overrun a large part of the country during the past two seasons has been mostly wasted. They followed each other in crowds up and down the main waterways, but did little effective work. As a matter of fact, less genuine prospecting has been done since the Klondike discoveries than in the preceding years, notwithstanding the rush. Thousands of streams in the gold belt stretching for hundreds of miles from Atlin to the Klondike and farther to the north, still remain to be explored, and the work of the prospector will not be completed for many years.

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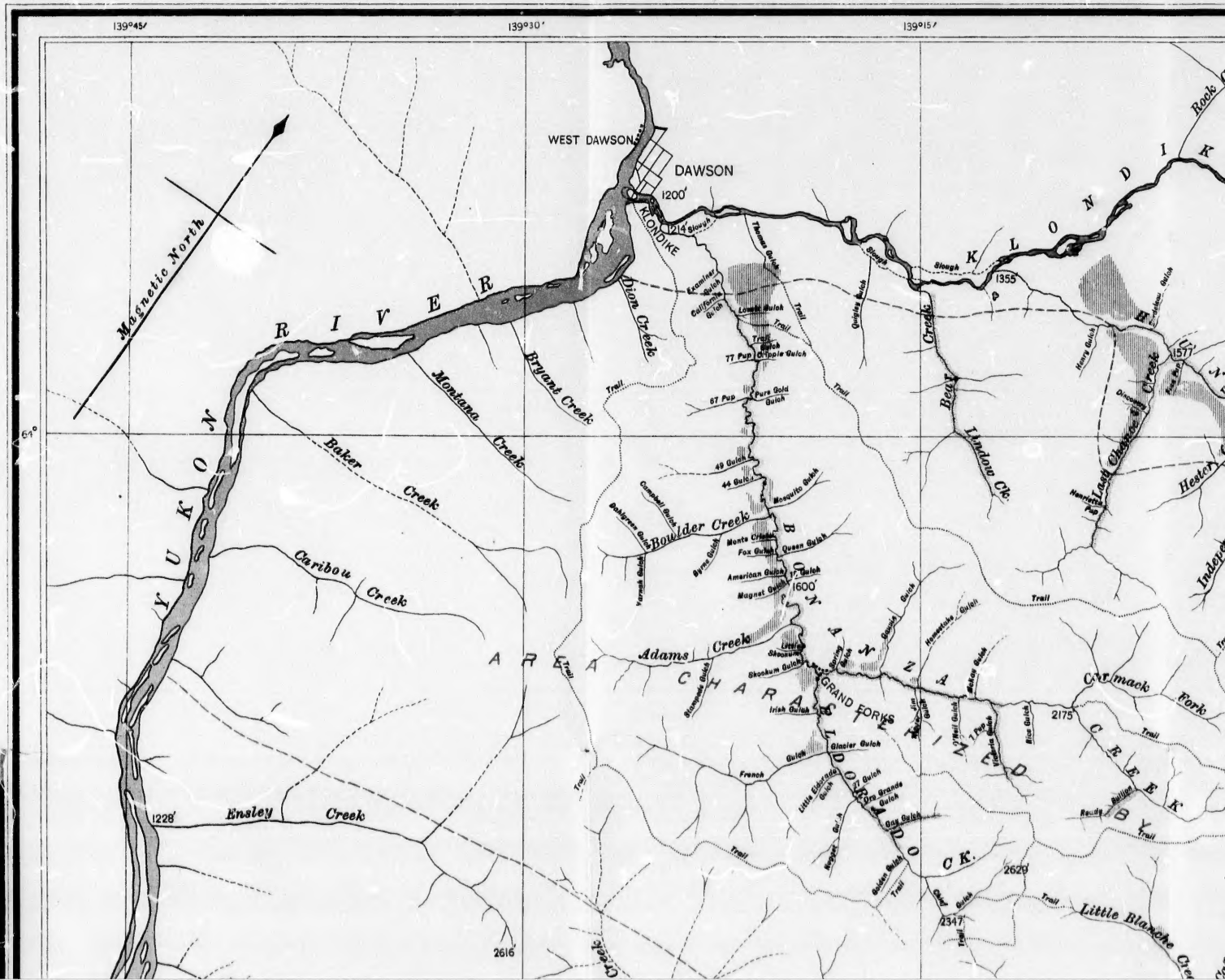

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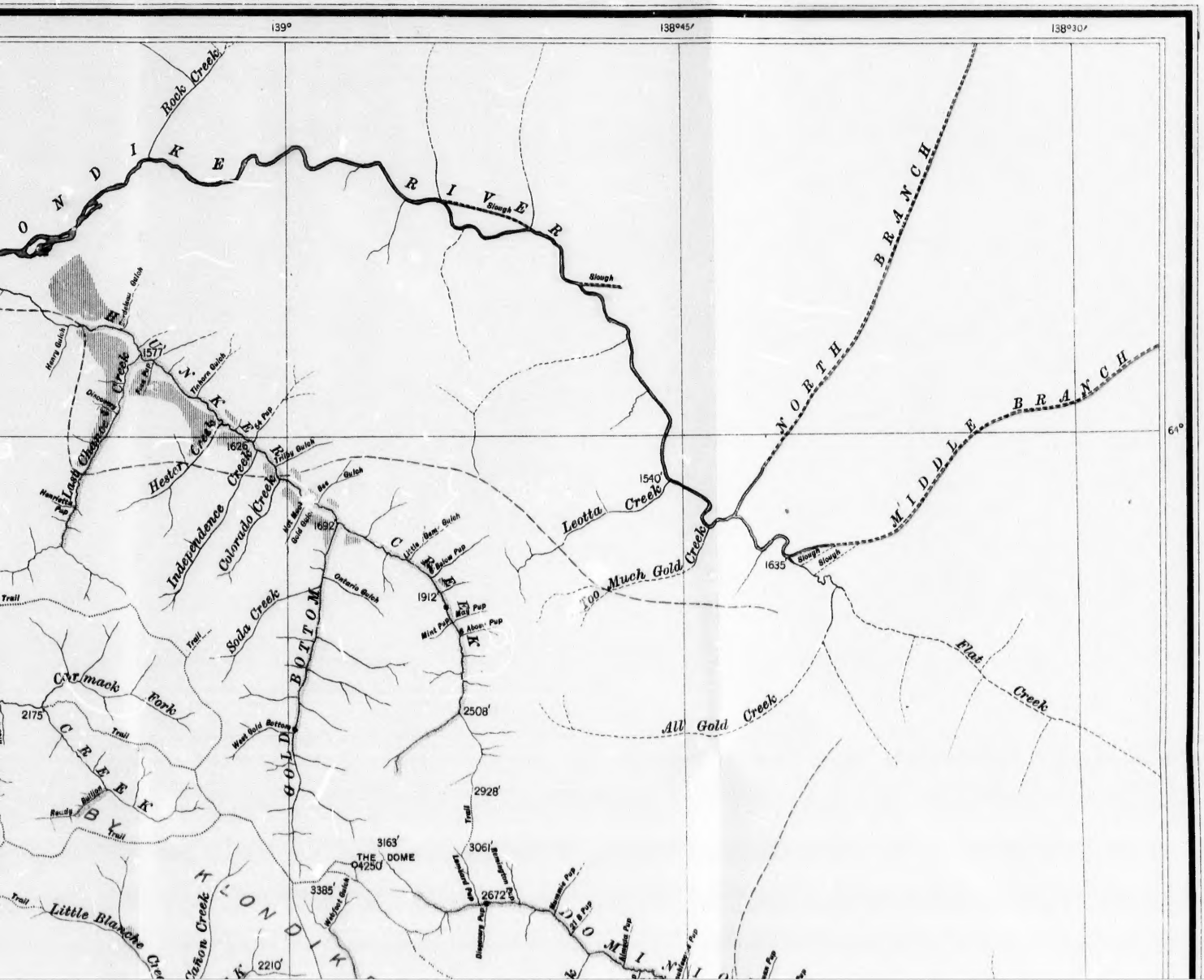
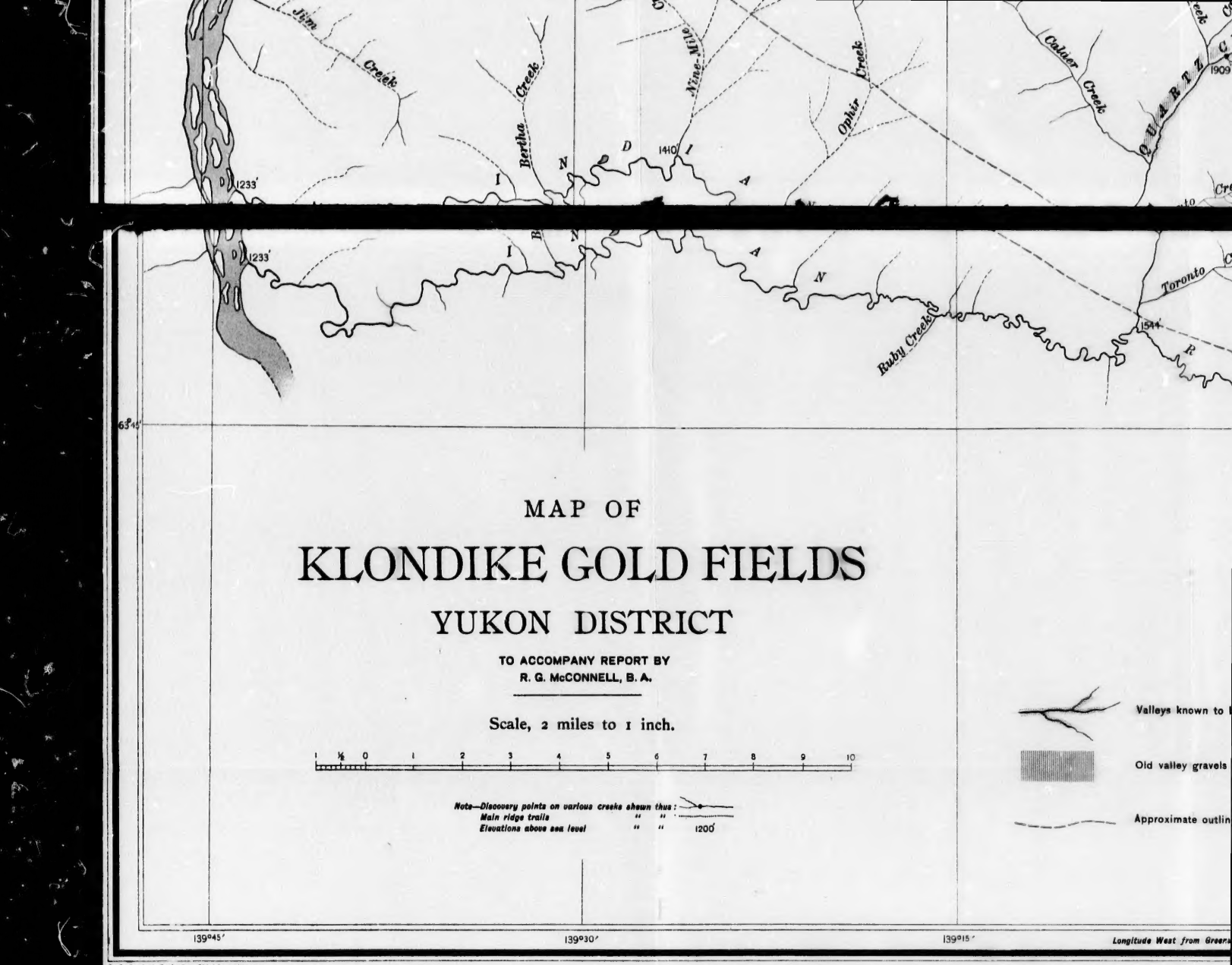




MAP OF

KLONDIKE GOLD FIELDS

YUKON DISTRICT

TO ACCOMPANY REPORT BY
R. G. McCONNELL, B. A.

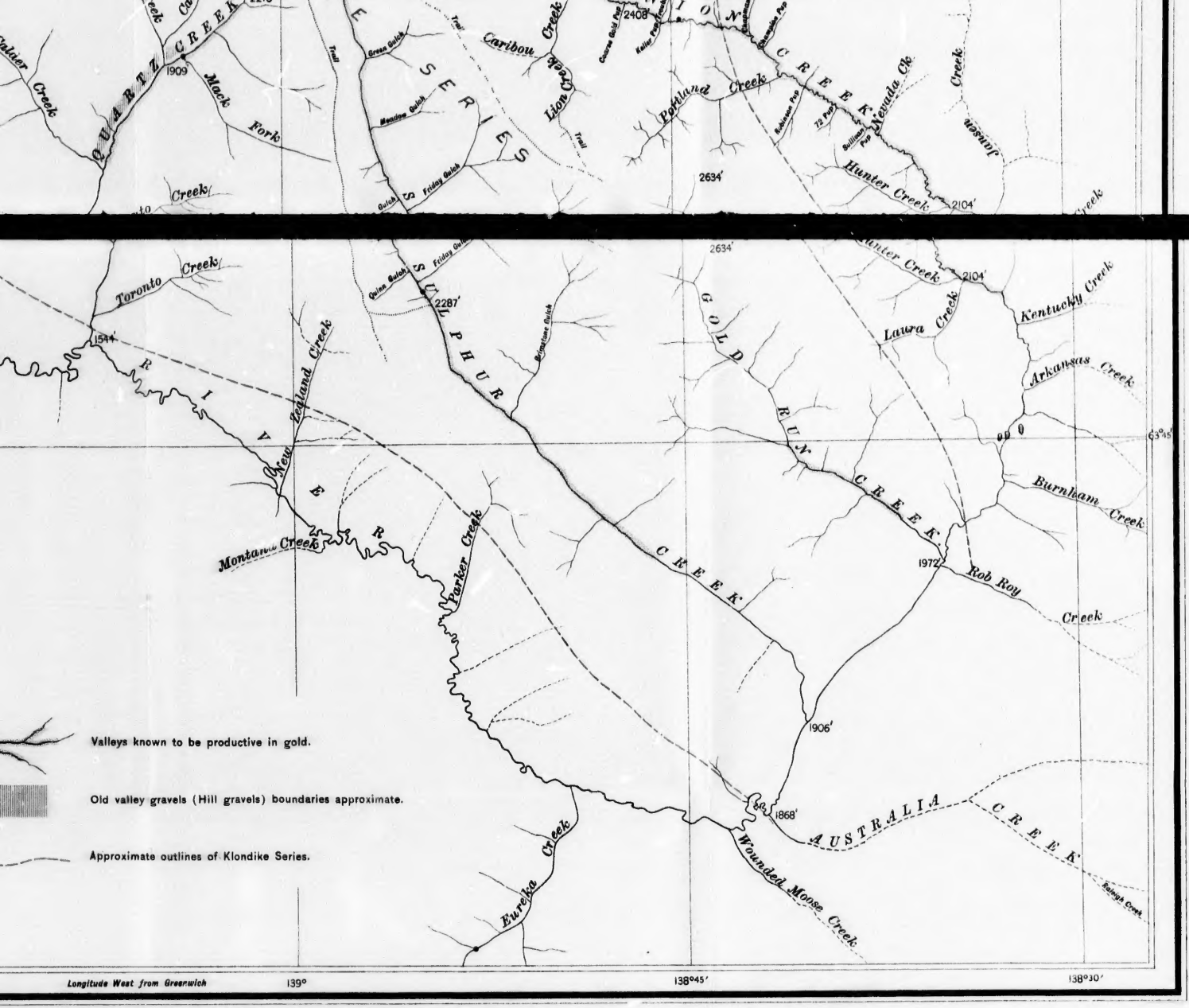
Scale, 2 miles to 1 inch.

1 ½ 0 1 2 3 4 5 6 7 8 9 10

Note—Discovery points on various creeks shown thus:
Main ridge trails " "
Elevations above sea level " " 1200'

Valleys known to
Old valley gravels
Approximate outlin

C. O. Senécal, B. A. Sc., Chief Draughtsman.
Compiled and drawn by J. F. E. Johnston, from surveys by Topographical Surveys Branch, Dept. of the Interior, and by J. F. E. Johnston, Geological Survey Dept.


Valleys known to be productive in gold.
Old valley gravels (Hill gravels) boundaries approximate.
Approximate outlines of Klondike Series.
Longitude West from Greenwich
139°
138°45'
138°30'
63°45'
Toronto Creek
1544'
New Zealand Creek
Montana Creek
Parker Creek
Eureka Creek
Wounded Moose Creek
AUSTRALIA CREEK
1868'
1906'
Rob Roy Creek
1972
Burnham Creek
Arkansas Creek
Kentucky Creek
Laura Creek
Hunter Creek
2104'
2634'
Portland Creek
Lion Creek
Caribou Creek
Mack Fork
Quartz Creek
1909
Sulphur Creek
2287'
Gold Run Creek
Bonanza Creek
2408
Dominion Series
Klondike Series